Miss Daytona build – 18

This document was written by Paul Naylor and is published here for FMES online viewing, and was written during 2026.

I always knew that the manufacture of the 'engine' was looming, so I started to look for some ideas on how to make it. Note that I am not endeavouring to make a 'Gerald Wingrove' standard of miniature here, so let's not have great expectations! The engine needs to capture the character of the real engine but of necessity not as complicated. The governing factors here are:

- The engine needs to be light (but strong enough to stand some handling)
- It needs to cover the electric motor with some room to spare for cooling etc.
- It needs to be removeable easily by being a 'cover' for the electric motor rather than an integrated device.
- Its proportions need to match the rest of the boat regardless of actual scale
- It needs to be based on scaled photos, and practical constraints, with the attendant simplification.
- It needs to be made from aluminium so that the colour and finish are representative, and to avoid the use of glue at least in visible large quantities where possible.

A lot of the above precludes carving it from solid lumps and the use of 'real' bolts (not that I fancy tapping aluminium for 12BA/M1.4 or less threads anyway). I may be able to mimic some bolts with little rivets and even bolts glued (or rivetted) in place if I can find some that look OK. I seemed to me that the best way is to regard it as a few shaped pieces fitted together, mainly made from thin sheet metal shaped and soldered together.

So much for the model, what about the real engine? This was based on a famous series of engines made for racing purposes, mainly in cars. These were designed and made by Offenhauser and Miller in the USA in the 1920s, and the one fitted to the boat had 4 cylinders in line with overhead camshafts and a rather large and obvious supercharger. I was able to supplement my boat photos with some similar engines by searching for Miller and Offenhauser engines, and some of these images helped me identify the main structure of the engine and relative sizes.

The photo shows the real thing to give a flavour of what I am trying to create!

The most important assembly comprises the crankcase, cylinder head and cam covers since this allows more detailed bits to be mounted on it separately.

My main thought is to bend this from 1mm thick aluminium sheet around a wooden former then with ends soldered on. When I have done this, I can then start adding other bits. Fortunately, the essential shape is simple in form anyway and so I started by defining the cross section of this in card to help me shape some wood. I offered several trial pieces up to the hull and ended up with a reasonable representative cross section as can be seen in the photo, propped up in position in the hull, and that will 'house' the electric motor which is installed behind the card template.

Gluing a few pieces of MDF and some other bits and shaping them with a saw and files etc gave a good representation of the engine block to use as a former. The advantage with doing this (apart from making something to bend metal around) is that it shows what the 3-D engine starts out looking like. All I have to do is to make it in metal. The finish of the former is not important – it's the size that matters: I sealed the MDF (which, after sanding, is dusty) with shellac. I do not have much experience in shaping aluminium sheet, so this will be a journey of discovery, as will be soldering the bits together – never stop learning!

The 1mm aluminium sheet arrived and I could test the first of my ideas, wrapping the wood block with metal. I am making the engine length a little longer than scale (as far as I can tell from photos) to fill the gaps better - caused by the elongated hatch opening - and make it more of a prominent feature. The result of bending, clamping and some hammering is as the photo shows, with the 'case' trimmed to sit at the right angle in situ in the hull (note that the photo is distorted – the bends are quite parallel! I have yet to do a little smoothing of dents, but it bent fine without annealing, although there is a little spring in the metal that will need taming when I put the ends on.

After some research, I ordered some 'ALU flux' that seemed to be recommended as the best solder flux to use on aluminium. This is a thickish liquid that you brush onto the join surfaces and then heat with a gas flame and add solder. My first trial was to see if I could solder two bits of aluminium sheet together using solders I had 'in stock'. The photo shows the results, the right hand one is Fry's lead-free plumbing solder, and the left one is old fashioned lead solder, as I had some of both. The central one is tin rich (60%) lead flux cored solder (for electrical work etc). My aim was to see if they actually stuck the bits together strongly (they all did) and then to see how well they flowed into a joint. The lead-free stuff did not flow at all, just beaded where I melted a bit of rod, the older solder flowed a bit but still had the tendency to bead. The flux cored tin rich solder did the best and so I will try to find some of this without the flux core (which I think does nothing for aluminium soldering). I suspect that the flux cored solder is lower temperature (ie for soldering irons) and so it had time to flow before I cooked the Alu flux with a small propane burner. I also noted that the Alu flux does not last long (or it is easy to burn), so it needs doing quickly and with 'just enough' heat. That suggested a *modus operandi* that was bothering

me: I can stick the plates together with the higher temperature stuff (ie a blob here and there on the inside) and then go round the outside joint with the low temperature solder hopefully without disturbing the positions of previous joints. Aluminium conducts heat quickly and keeping a Goldilocks temperature at the place you want to solder is likely to be difficult (ie just right!). I do have a copper soldering iron that is heated up in a gas flame - I have used this for leaded glass joints and that might work - worth a test, so watch this space!

I cut out the ends for the casing and soldered them (the big blob principle in the main) up. The ends have large holes in the 'crankcase' for air and clearance for the motor and shaft, and in any case, there are some covers to go on top of these later. The ends are different: one just has square cam cover ends 'bolted' to it, the other has the cam drive gears.

The next bit to tackle was the cam drive casing on the driver's end of the engine. I decided to try to make this from formed aluminium plate and made up two wooden formers to the right shape to bash the plate around. I eventually managed it (annealed the plate twice) without too many splits: the hard bit was making two mirror images to join together. For this I used the solder again, hoping to get it to flow into the join so it looked like a casting. Some hope: getting it to flow (whichever type and using a flame or iron) is very hit and miss, especially for small bits. If it was copper or brass the solder would 'flash' into the joint, but nothing like this here. On the bright side, the engine will be the right colour and lightweight, as long as it remains stuck together. After many solder iterations, and much filing, I ended up with a passable bit that can take its place on the engine. For the photo, I have put it in place: an essential step to make sure it fits and is easily removeable. I hope to grit blast this lot as a finish (that should do for the solder) and this will not show reflections that highlight surface blemishes, but it might have to be paint!

Continuing with deciding on and adding bits in the same sort of way, the engine is taking shape. I have given up trying to get all the joints full of solder and for a few that are obvious will experiment with 'aluminium filler' based on aluminium powder and epoxy later on. I have also 'given in' and turned one item so far from solid (it was a small cone shape). I am also not going to risk trying to solder assemblies together, some of them already have had two or three 'heatings' and the larger they are the more likely it is that small bits will become unsoldered, so I am bolting some together. I found a 1000 piece M2 nut and bolt set and a 1000 piece M1.2 and M1.4 set of 'spectacle repair screws', both together for around £12 – these will provide enough fixings for the engine and some decoration too. I am trying to put visible fixings in 'likely' places, but some real ones will be very difficult to mimic, being secured in cast in parts of the engine (like the bolts on top of the curved cam covers). The results so far can be seen in the photo, with a similar performance required at the other end, including the rather awkward and prominent supercharger housing. That can be seen on the right. It looks an odd shape, and it is something like this in real life, but a lot is conjectural. It is getting

heavier, but still only c100 grammes and that is now for all the biggest bits. Since I have finished soldering at the rear end (right hand end in the photo) I have run a fillet of epoxy into the inner joints of the main block in case the filing I did weakened the solder fillets.